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Gross et al.

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[54]		DPIC DEVICE FOR AN CULAR LENS
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[73]	Assignee:	Visioncare Ltd, Yehud, Israel
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[22]	Filed:	Jun. 26, 1997
[51] [52] [58]	U.S. Cl	
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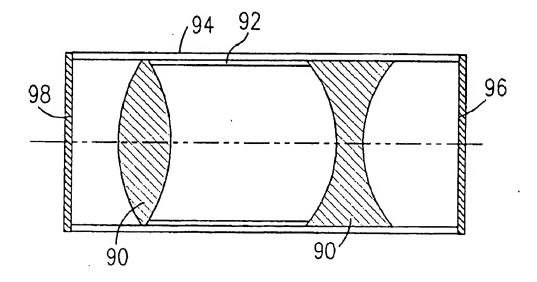
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Primary Examiner-David H. Willse Attorney, Agent, or Firm-Darby & Darby

ABSTRACT

An intraocular lens implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and the posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and the posterior end.

14 Claims, 4 Drawing Sheets



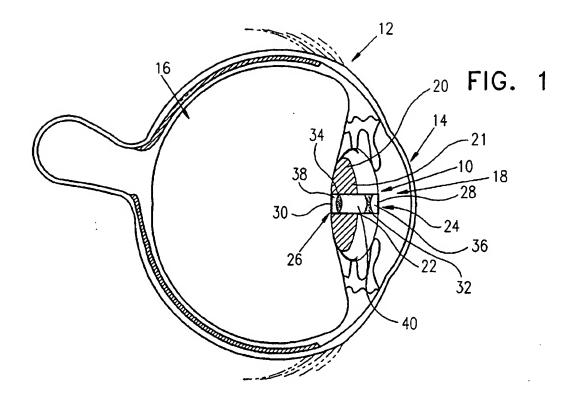


FIG. 2

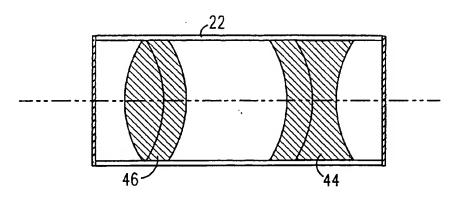
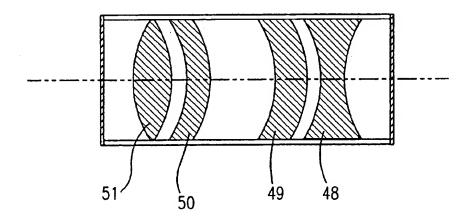
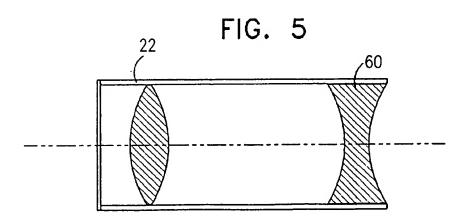
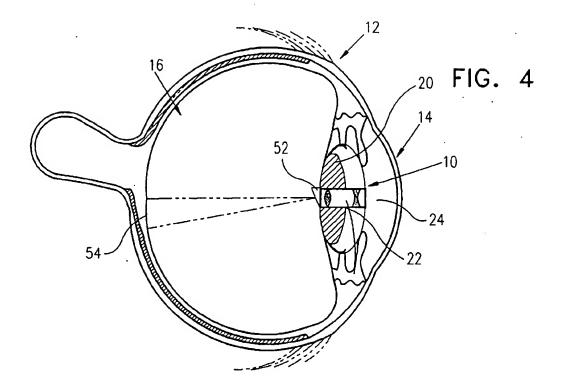
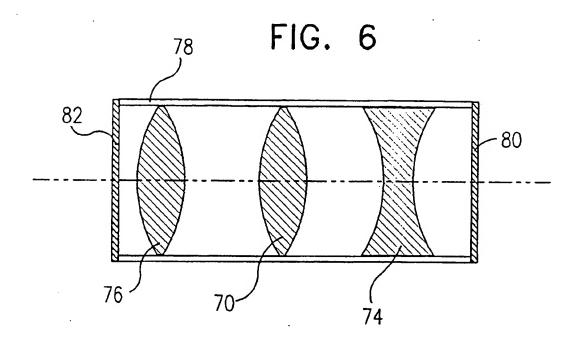


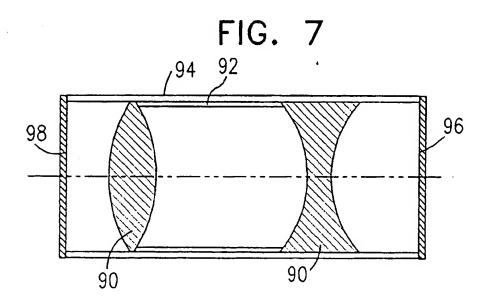
FIG. 3











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TELESCOPIC DEVICE FOR AN INTRAOCULAR LENS

FIELD OF THE INVENTION

The present invention relates to intraocular lens implants generally.

BACKGROUND OF THE INVENTION

Various types of intraocular lens implants are known in the patent literature. Particular reference is made to U.S. Pat. Nos. 5,391,202 and 5,354,335 of the present applicant/assignee and to the references cited therein. Other relevant references include European Published Patent Application EP-A-212616, U.S. Pat. Nos. 4,074,368; 4,172,297; 4,759, 15761 and 5,275,623 and French Published Patent Application 2,666,735.

The utility of intraocular lens implants is described in the above patent references. The disclosures of the abovementioned publications are hereby incorporated by reference.

SUMMARY OF THE INVENTION

The present invention seeks to provide improved $_{25}$ intraocular lens implants.

There is thus provided in accordance with a preferred embodiment of the present invention an intraocular implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and said posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and said posterior end.

In accordance with a preferred embodiment of the present 35 invention, the lenses are doublet lenses.

Preferably, the windows are generally without optical power.

In accordance with a preferred embodiment of the present invention air gaps are defined between the lenses and between the lenses and the windows.

In accordance with a preferred embodiment of the invention, one of the windows may define a prism.

In accordance with an alternative embodiment of the 45 present invention, the lenses may be joined together by a cylindrical member disposed within the telescope body.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

FIG. 1 is a simplified pictorial illustration of an intraocular insert constructed and operative in accordance with a preferred embodiment of the present invention located within a human eye;

FIG. 2 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but including joined doublet lenses;

FIG. 3 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 2, but including separated doublet lenses;

FIG. 4 is a simplified pictorial illustration of an intraocular insert, located within a human eye, of the general type 65 shown in FIG. 1, wherein one of the windows comprises a prism;

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FIG. 5 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but having only one window;

FIG. 6 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but including more than two lenses; and

FIG. 7 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, wherein a telescope is encapsulated within an outer housing having windows.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference is now made to FIG. 1, which is a simplified pictorial illustration of an intraocular insert constructed and operative in accordance with a preferred embodiment of the present invention located within a human eye.

As seen in FIG. 1, there is provided an intraocular lens implant, indicated generally by reference numeral 10, which is implanted in the interior of a human eye 12. In the illustrated embodiment, the implant comprises a telescope 18 which preferably extends through at least a portion of a lens capsule 20 of the eye 12. The telescope 18 may extend forwardly of the lens capsule 20 toward the anterior side 14 of the eye. Alternatively it may extend posteriorly of the lens capsule or both.

In accordance with a preferred embodiment of the present invention, the telescope 18 is mounted on a carrying lens 21. Alternatively, the telescope 18 may be mounted in the lens capsule by loops or any other suitable apparatus.

In the illustrated embodiment of FIG. 1, it is seen that the telescope comprises a telescope body 22, typically of circular cylindrical configuration and formed of glass or other suitable non-porous bio-compatible material or other material which is coated with a suitable non-porous bio-compatible material.

Sealed to anterior and posterior ends 24 and 26 of the telescope body 22 are respective windows 28 and 30 which preferably do not have optical power. Mounted onto telescope body 22 intermediate windows 28 and 30 there are provided forward and rearward lenses, 32 and 34. Preferably air gaps 36 and 38 are defined between lenses 32 and 34 and respective windows 28 and 30 and an air gap 40 is defined between lenses 32 and 34.

According to an alternative embodiment of the present invention, illustrated in FIG. 2, joined doublet lenses 44 and 46 may be employed to avoid chromatic aberrations.

According to a further alternative embodiment of the present invention, illustrated in FIG. 3, joined doublet lenses 48 and 49 and 50 and 51 may be employed. The configuration of FIG. 3 may be used to provide enhanced optical

According to another alternative embodiment of the invention, illustrated in FIG. 4, one of the windows may be in the form of a prism 52, thereby to direct light passing therethrough off-axis onto a portion 54 of the retina which lies alongside portions of the retina which may have been rendered inoperative by disease.

According to further alternative embodiments of the present invention, illustrated in FIG. 5, one of the windows may be eliminated and one of lenses, here indicated by reference numerals 60, also serves as a window.

According to yet another alternative embodiment of the present invention illustrated in FIG. 6, an additional lens 70 may be provided spaced from forward and rearward lenses

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74 and 76 respectively along a telescope body 78 between windows 80 and 82.

According to yet another alternative embodiment of the present invention illustrated in FIG. 7, a plurality of lenses 90 may be joined together by a cylindrical member 92 5 disposed within a telescope body 94 intermediate windows 96 and 98.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the present invention includes both combinations and subcombinations of the various features described hereinabove as well as variations and further developments thereof which would occur to persons skilled in the art upon reading the above description and which are not in the prior art.

We claim:

- 1. An intraocular lens implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and said posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and the posterior end, wherein said at least two lenses are joined together by a cylindrical member disposed within the telescope body.
- 2. An intraocular lens implant according to claim 1 and wherein at least one of said at least two lenses are doublet lenses
- 3. An intraocular lens implant according to claim 2 and wherein said at least one window is generally without optical power.

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- 4. An intraocular lens implant according to claim 2 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 5. An intraocular lens implant according to claim 2 and wherein at least one window defines a prism.
- 6. An intraocular lens implant according to claim 2 and wherein said doublet lenses are joined doublet lens.
- 7. An intraocular lens implant according to claim 2 and wherein said doublet lenses are separated doublet lens.
- 8. An intraocular lens implant according to claim 1 and wherein said at least one window is generally without optical power.
- 9. An intraocular lens implant according to claim 8 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 10. An intraocular lens implant according to claim 8 and wherein at least one window defines a prism.
- 11. An intraocular lens implant according to claim 1 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 12. An intraocular lens implant according to claim 11 and wherein at least one window defines a prism.
- 13. An intraocular lens implant according to claim 1 and wherein at least one window defines a prism.
 - 14. An intraocular lens implant according to claim 1 and wherein one of said lenses is a positive lens disposed towards said posterior end and another of said lenses is a negative lens disposed towards said anterior end.

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(12) United States Patent Glick et al.

(10) Patent No.: (45) Date of Patent:

US 6,616,692 B1 Sep. 9, 2003

(SI) INTRAOCULAR LENS COMBINATIONS

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(73) Assigner: Advenced Medical Optics, Inc., Santa Ana. CA (US)

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.; 09/390,380

(22) Filed: Sep. 3, 1999

Reinted U.S. Application Data Provisional application No. dG/132,081, filed on Apr. 30, 1999.

IM. Cl.' U.S. Cl. A61P 2/16 623/634; 623/6.37 Field of Search 623/6.11, 5.22, 623/6.34, 6.37, FOR 105

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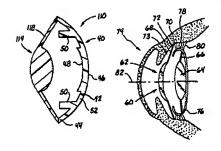
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Primary Examiner—David H. Willac (74) Antorney, Agent, or Firm—Stout, Use, Buyan & Mullins, LLP; Frank J. Use; Pater Jon Glock

ABSTRACT

Intracoular iras combinations are provided which include a first opic horizing a negative princial power and abeing adapted to be placed in a substantially fixed position in a mannation eye. A second opic having a higher opicial power than the first opicie is provided. In addition, a movement assembly is provided which is coupled to the second opic and is adapted to cooperate with the eye to effect accommodating movement of the second opic in the eye. Very effective seconmodation of the provided with the present intraocular less combination. The present combinations can be effectively include a confidence of the conf Intraocular iens combinations are provided which include a

24 Claims, 2 Drawing Sheets



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US 6,599,317 B1 t: Jul 29, 2003 (10) Patent No.: (45) Date of Patent:

(54)	INTRAOCULAR LENS WITH A
	TRANSLATIONAL ZONE

(75)	Joseph I. Weinschenk, III, Fr. Worth, TX (US); Charles X. Liao, Irvins, CA (US); Massoud Gharizadeh, Leguna Nicol. CA (US)
	NICOL CA (US)

(73) Assigner: Advanced Medical Optica, Inc., Santa Ana, CA (US)

Subject to any disclaimer, the term of this patient is extended or adjusted under 35 U.S.C. 154(b) by 47 days.

(21) Appl. No.: 09/657,251

(22) Filed: Sep. 7, 2000

Prior Publication Data (65)

(65)

Related U.S. Application Data

(60) Provisional application No. 60/154,745, fixed on Sep. 17, 1959.

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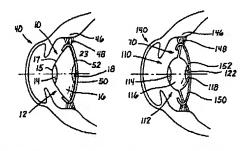
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Primary Examiner—David H. Willse (74) Antorney, Agent, or Form—Stort, Uxe, Buyan & Mullins LLP, Frank Uxe, Peter Jon Gluck

ABSTRACT

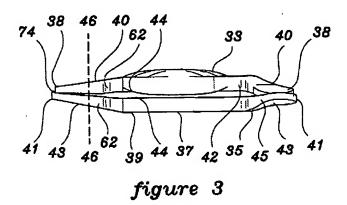
An intesoculis less (10L) for eac in a mammalian eye includes an optic adapted to focus light toward a retim of the mammalian eye and, in cooperation with the mammalian eye, to provide accommodation, the optic incheding a fint portion adapted to move in response to the action of the mammalian eye; and a second portion secret to the first portion and having a higher index of refraction than the first portion and/or being positioned generally anterior of the first portion and/or being positioned generally anterior of the first portion.

31 Claims, 2 Drawing Sheets



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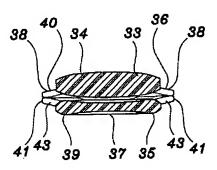
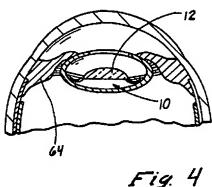
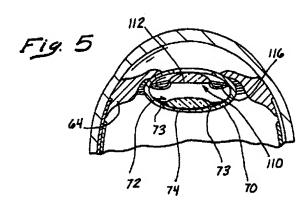


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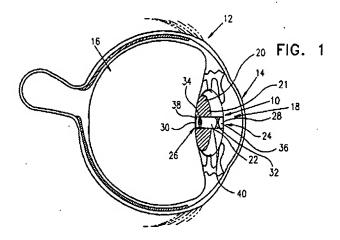
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(12) United States Patent Glick et al.

(10) Patent No.: (45) Date of Patent:

US 6,616,692 B1 Sep. 9, 2003

(54) ENTRAOCULAR LENS COMBINATIONS

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	(US), Dontel G. Brady, San Juan

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(21) Appl. No.: 09/390,380

(22) Filed: Sep. 3, 1999

Reinted U.S. Application Data
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(51) Int. Cl. A61F 2/16 (52) U.S. Cl. 623/6.34, 623/6.37 (58) Floid of Search 623/6.34, 6.37, FOR 105

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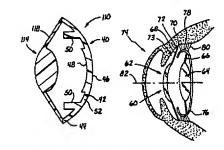
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Primary Examiner—David H. Willse (74) Anorrey, Agent, or Firm—Scott, Uxe, Buyan & Mullins, LLP; Frank J. Uxe; Peter Jon Gluck

ABSTRACT (57)

(37) ABSTRACT
Intracroler lens combinations are provided which include a first optic having a negative cytical gower and being adapted to be placed in a substantially fixed position in a mannatilian eye. A second optic having a higher optical power than the first optic in provided, this is cougled to the second optic and is adapted to cooperate with the eye to effect recommedating movement of the second optic in the eye. Very effective scommodation is provided with the present intraordial lens combination. The present combinations can be effectively positioned to effectively include or effectively include or effectively positioned to effectively include or effectively positioned to effectively include or effectively included or effective or effectively included or effective or effective or effective or effective or

24 Claims, 2 Drawing Sheets



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(12) United States Patent Weinschenk, III et al.

(10) Patent No.: (45) Date of Patent:

US 6,599,317 B1 t: Jul. 29, 2003

(54) INTRAOCULAR LENS WITH A TRANSLATIONAL ZONE

(75)	inventors:	Joseph I. Weinschenk, III, Fr. Worth, TX (US); Chartes X. Liao, Irvine, CA (US); Messoud Gharizadeh, Laguna
		Nigel CA (IIS)

(73) Assigner: Advanced Medical Optica, Inc., Santa Ana, CA (US)

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 47 days.

(21) Appl. No.: 09/657,251

(22) Filed: Sep. 7, 2000

Prior Publication Data (65)

(65)

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(60) Provisional application No. 60:154,745, fixed as Sep. 17, 1999.

(51) Int. CL7 A61F 2/16 (52) U.S. Cl 623/6-34, 623/6-37, 623/6-28 (58) Fletd of Search 673/611, 5.13, 673/61,2-2, 6.24, 6.27-6.39, 5.43-6.44, FOR 105

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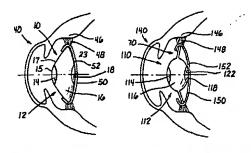
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Primary Examiner—David H. Willse (74) Americe, Agent, or Firm—Stout, Uxa, Boyan & Mullins LLP, Frank Uxa; Peter Ion Glack

ABSTRACT

An intraceular less (IOL) for use in a mammalian eye includes an optic sclapact to focus light toward a retina of the mammalian eye, so provide accommodation, the optic including a first portion adapted to move in response to the action of the mammalian eye; and a second portion secured to the first portion and having a ligher index of refraction that the first portion and/or being positioned generally anterior of the first portion and/or being positioned generally anterior of the first portion.

31 Claims, 2 Drawing Sheets



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		Document			To s				Title	
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4.	US.	6638305		U.	200			13	Monofocal	
12.	US	6638304 20030199	B2	Ų	200			19	Vision pro	
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51	บร	2003018 2003018	7504	U	200 200			17 6	Accommodat	
55	US.	2003018		Ü	200			18	Adjustable Intraocula	
54	us	2003017		Ü	200			18	Accommoda	
54	us		B1	Ü	200	309	Ô9	11	Intraocul	
25	ÜS	2003015	3599	Ū	200	308	21	9	Accommoda	
26	บร	6599317	B1	Û	200			12	Intraocul	
27	บร	2003013	5272	U	200			17	Accommoda	
28	บร	2003013		U	200			7	In-vivo a	
29	บร	6592621	B1	U	200	307	15	4	Flexible:	i n 🎆
30	US	20030130		U	200			29	Haptics fo	or 🔛
31	บร	2003012		U	200			18	Binocular	
32	US.	6585768		U	200	307	01	19	Intraocul	
33	US.	2003011		U	200			36	Intraocul	
34	บร	2003010		U	200			16	Accommoda	
35	US.	2003010		U	200			10	Accommoda	댽쏇
35	US.	6576012		U	200 200	306	10	19	Binocular	;:å∭
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36	US	2003010 2003009	3322 3150	U	200	305	15	19	Multi-foc Lanses ca	
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41	us	6557998		Ü	200				Multifoca	
42	us	2003008		Ü	200			19	Intraocul	
43	ÜŠ	6554859		Ü	200			18	Accommoda	
44	us	2003007	8658	Ū	200			88	Single-pi	
45	บร	2003007		U	200	304	24	88	Materials	
46	บร	2003007	8656	U	200	304	24	88	Accommoda	
47	บร	6547822	B1	U	200			13	Opthalmic	1
48	ŲS.	2003006	0881	U	200			12	Intraocul	
49	บร	6537317		U	200			11	Binocular	
50	US.	6533813		U	200			12	Intraocul	
51	US	2003005		U	200			6	Lens for	
52	US	2003005		U	200			13	INTRAOCUL	
2.5	US.	2003004		U	200			13	Ophthalmi	
54	US	6527389		U	200			14 44	Multifoca Method of	
55 56	บร บร	2003003		Ü	200	301 301	23	20	Accommoda	
57	US	2003001		U	200			18	Vision pr	
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59	ÜS	6503276		Ū	200			11	Accommoda	
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61	บร	6494911		Ü	200			38	Accommoda	
62	บร	2002018		U	200			19	INTRAOCUL	
63	บร	2002018		U	200	212	12	12	Monofocal	i.
64	บร	6488708		U	200			16	Open cham	be
65	บร	2002017		U	200			5	Accommoda	
66	บร			U	200			16	Multifoca	
67	บร	2002016		U	200	210	31	8	Primary a	
68	us			U	200			10	Moveable	
69	US	2002015		υ	200			11	Intraocul	
260	US	6464725	B2		200			12	Two-lens	
71	บร	6461384	B1	U	200	Z 1 U	UB	:T.)	Intraocul	al z
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(12) United States Patent Skotton

(10) Patent No.: (45) Date of Patent:

US 6,464,725 B2 at: Oct. 15, 2002

(SI) TWO-LENS ADJUSTABLE INTRAOCULAR LENS SYSTEM

(76) Inventor: Bernt Christian Skotton, 273 Mather St., Piedmont, CA (US) 94611-5154

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days. (*) Notice:

(21) Appl. No.: 09/768,876

(65)

(56)

(22) Filed: Jan. 23, 2001

Prior Publication Data

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(S1) Int. Cl. A61F 2/16 (S2) U.S. Cl. 623/6.34; 623/6.37; 623/6.32 (S8) Fleid of Search 523/6.34, 5.37, 623/6.32

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Primary Examiner-Dinh X. Nguyen

(5?) ABSTRACT

(27) Alson system for implantation in a human eye which makes it possible to restore accommodation. The lens system completes one attention lens (2) and a posterior lens (4), out of these two leaves one has postire and the other has negative lens power. Accommodation is achieved by waying the distance between the two lenses. This lens system can be made so as to generate large changes in optical power for small changes in position. It also allows the amount of change in distance between the lenses to be selected relatively independently of the optical power of the overall lens system.

9 Claims, 5 Drawing Sheets

